Cal/Ecotox
Exposure Factors for Double-crested Cormorant (Phalacrocoras auritus)*

Endpoint Type	Endpoint Value	Error	Range	Units	Sex	Life Stage	Location	Note	Reference
Body Weight - Mean	2162.2	29.8 SE	1650-2600	g	F	Adult	LA	a	1
Body Weight - Mean	2498.1	16.0 SE	2000-3000	g	M	Adult	LA	b	1
Body Weight - Mean	2.3	0.02 SE		kg	B	Both Adult and Juv.	TX	c	2
Body Weight - Mean	1.33			kg	NR	Both Adult and Juv.	Lab	d	3
Body Weight - Mean	1900.5	189.8 SD		g	NR	Fledgling	CANADA	e	4
Body Weight - Mean	34.7	2.96 SD		g	NR	Hatchling	CANADA	f	4
Body Weight - Mean	36			g	NR	Hatchling	UT	g	5
Body Weight - Mean	1543			g	NR	Juvenile	UT	h	5
Body Weight - Mean	1900			g	NR	Nestling	NH	i	6
Clutch or Litter Size	3.1+/- 0.1 to 3.2+/- 0.1				F	Adult	CA	j	7
Clutch or Litter Size			2.82-3.62		F	Adult	NY	k	8
Clutch or Litter Size	3.8		2-6	eggs/nest	F	Adult	UT	l	5
Clutches or Litters per year			1-2	clutches/yr	F	Adult	UT	m	5
Dietary Composition	cunner (59.7%), winter flounder (15.5%), sculpin (2.4%), rock eel (0.3%), American eel (6.6%), pollack (9.8%), mummichog (5.8%)				B	Adult	NH	n	9
Dietary Composition	shad (26.1%), large roughfish (2.5%), small forage species (1.2%), catfish (9.6%), bass (16.5%), sunfish (15.0%), crappies (5.6%), other fishes (23.3%)				B	Both Adult and Juv.	TX	o	2
Dietary Composition	herring (25%), sculpin (92%), flounder (8%), anemones (8%), snails (17%), mussels (33%), amphipods (25%), isopods (17%), benthic shrimp (25%), crabs (25%), bryozoans (58%), algae (50%)				NR	Both Adult and Juv.	CANADA	p	10
Dietary Composition	gunnels (5%), sculpins (1%), sand lance (44%), capelin (34%), flatfishes (11%), clupeids (4%), other (1%)			%	NR	Both Adult and Juv.	CANADA	q	11
Dietary Composition	sculpin, rock gunnel, blueback herring, alewife, wrymouth, sand shrimp, cunner, American eel, rock crab, N. Caridean shrimp, sand shrimp, white perch, yellow perch, rainbow smelt, N. lobster, Atlantic tomcod				NR	Nestling	ME	r	12
Duration of Incubation or Gestation	28		26-30	d	NR	Hatchling	UT	s	5
Fledging or Weaning Rate	0.98 +/- 0.07 to 1.78 +/- 0.06				B	Fledgling	CA	t	7
Fledging or Weaning Rate	2.14				B	Fledgling	NY	u	8
Food Ingestion Rate			10-125	g	NR	Juvenile	CANADA	v	4
Food Ingestion Rate	4.30	1.90 SD		feedings/d	NR	Juvenile	CANADA	w	4
Food Ingestion Rate	see figure			kcal/bird/day	B	Nestling	NH	x	9
Foraging Distance	15.7	2.0 SE	3.5-61.8	km	B	Adult	MS	y	13

Endpoint Type	Endpoint Value	Error	Range	Units	Sex	Life Stage	Location	Note	Reference
Growth Rate	0.120	0.017 SD			NR	Juvenile	CANADA	z	4
Growth Rate	0.208				NR	Nestling	NH	aa	6
Hatching Success	76%				B	Hatchling	CA	ab	7
Longevity	17-08			yr-mo	NR	Adult	USA	ac	14
Metabolic Rate			85-95	cm^3 O2/g BW/hr	NR	Both Adult and Juv.	Lab	ad	3
Metabolic Rate	74			cm^3 O2/g BW/hr	NR	Both Adult and Juv.	Lab	ae	3
Metabolic Rate	85			cm^3 O2/g BW/hr	NR	Both Adult and Juv.	Lab	af	3
Metabolic Rate			1.0-1.5	cm^3/g BW/hr	B	Nestling	NH	ag	15
Survival/ Mortality	12/46			number died/number hatched	NR	Juvenile	CANADA	ah	4
Time of Nesting	year-round				B	Adult	FL	ai	16
Time of Nesting	April-June				B	Adult	CA	aj	7

Notes

a	body weight; N=41; January-April
b	body weight; N=160; January-April
c	N=420 cormorants; east TX
d	N=5 cormorants
e	mean asymptotic weight of fledglings; N=33 chicks; Iles de la Madeleine Archipelago, Gulf of St. Lawrence
f	N=33 chicks; Iles de la Madeleine Archipelago, Gulf of St. Lawrence
g	N=16 birds; Age=1 d; Utah Lake, Utah County; Data for subspecies auritus
h	N=13 birds; Age=23 d; Utah Lake, Utah County; Data for subspecies auritus
i	asymptotic weight of nestlings; N=NR; Duck Island, Isle of Shoals
j	mean number of eggs/nest (over 3 years); N=263-312 nests/year; spring; San Francisco Bay estuary
k	range in mean clutches in ground nests (across 4 years); N=34-127 nests/colony; Age=spring; Lake Ontario (43 deg 53'N, 76 deg 24'W)
l	N=NR; Utah Lake, Utah County; Data for subspecies auritus
m	N=11 nests; Utah Lake, Utah County; Data for subspecies auritus
n	frequency by weight of fish regurgitated by adult cormorants; N=17 samples; Duck Island, Isles of Shoals (43 deg. N, 70 deg. 35' W)
o	percent occurence of prey items by weight in stomach contents; N=420 cormorants; east TX
p	frequency of occurrence of food items in stomach contents; N=12 stomachs; Quoddy Region, New Brunswick; cormorants exhibited higher tissue mercury concentrations (7.048 ug/g liver) than other marine birds, possibly due to benthic foraging.
q	proportion of prey species in diet by percent volume; N=187; June-July; St. Lawrence Estuary and Gulf; Composition determined by analysis of cormorant regurgitations. See tables for diet composition for different sampling areas and figures for seasonal frequency of prey species in diet.
r	primary dietary items from nestling regurgitant samples; N=673 samples; June-July; Penobscot Bay; see paper for relative frequencies of dietary items by region
s	average incubation; N=16 eggs; Utah Lake, Utah County; Data for subspecies auritus
t	mean number of chicks fledged/nest (over 3 years); N=296-424 nests/year; spring; San Francisco Bay estuary
u	mean number of young produced/active nest (across 10 yrs); N=NR; Age=spring; Lake Ontario (43 deg 53'N, 76 deg 24'W)
v	mean meal weight of chicks aged 5-37 days; N=2 chicks; Iles de la Madeleine Archipelago, Gulf of St. Lawrence; see table for breakdown of meal weights by age
w	mean frequency of daily feeding of first hatched chick of a brood; N=64 observations; Iles de la Madeleine Archipelago, Gulf of St. Lawrence
x	estimated average energy intake during the nestling period (to 50 days of age); N=NR; Duck Island, Isles of Shoals (43 deg. N, 70 deg. 35' W)
y	mean distance travelled from night roost to foraging site; N=33 birds; winter; Mississippi River Delta; 17.7% of daylight hours spent foraging
z	rate of growth from hatch to fledge; N=33 chicks; Iles de la Madeleine Archipelago, Gulf of St. Lawrence
aa	K; index of rate at which asymptotic weight is being gained; N=1-52/sample day; Duck Island, Isle of Shoals; see paper for table of daily average weights of nestlings

ab	proportion of nests in which at least one egg hatched; N=1056 nests; spring; San Francisco Bay estuary
ac	from USFWS Bird Banding Laboratory data; N=4174 band recoveries
ad	minimal metabolic rate measured over a range of incident radiation (0-700 watts/m^2); N=5 cormorants
ae	measured at night over temperature range -10 to 45 C; N=5 cormorants
af	measured during the day over temperature range -10 to 45 C; N=5 cormorants
ag	oxygen consumption during brooding period (to about 2 wks of age); N=NR; Duck Island, Isle of Shoals (43 deg. 00'N, 70 deg 35'W); see figures for oxygen consumption over a range of ambient temperatures
ah	N=14 nests; Iles de la Madeleine Archipelago, Gulf of St. Lawrence; most mortality observed 2-5 days post hatch
ai	time during which active nests were observed; N=30 colonies; south FL; peaks in June, March
aj	period during which nest initiations were observed; N=296-424 nests/year; spring; San Francisco Bay estuary

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